

CLAIMS

1. A controller comprising:
 - a casing fixed to an upper part of a main body;
 - a valve rod arranged projecting downward to the casing and moving up and down in a reciprocating manner;
 - an operating shaft arranged in the casing in a freely up and down moving manner;
 - a power transmitting means for amplifying a force applied on the operating shaft and transmitting to the valve rod;
 - a biasing means for biasing the operating shaft downward; and
 - a pressure chamber, formed between a piston arranged on the operating shaft and a partition plate arranged below the piston and fixed to the casing, for moving the operating shaft upward when an operation gas is introduced, wherein
- the controller further comprises a slow start means for slowly moving the valve rod upward, the slow start means including:
 - the piston having an outer diameter smaller than an inner diameter of the casing and movable in up and down direction with respect to the operating shaft;
 - a pressure spring, arranged between a spring receiver

arranged at an upper part of the operating shaft and the piston, for applying an elastic force corresponding to an amount of up and down movement of the piston on the spring receiver and the piston;

a diaphragm, arranged between an outer peripheral edge of the piston and the upper casing, for partitioning the pressure chamber and a space on an upper side of the piston;

an operation gas introducing chamber arranged below the partition plate;

a constantly opened communication passage, formed in the partition plate, for communicating the pressure chamber and the operation gas introducing chamber;

a flow adjusting valve for adjusting a flow of the operation gas introduced into the constantly opened communication passage;

an auxiliary communication passage, formed in the partition plate, for communicating the pressure chamber and the operation gas introducing chamber; and

an open-close valve, arranged in the auxiliary communication passage, for opening the communication passage when the piston is at the lower most position and closing the communication passage when raised from a position by a predetermined distance and reaching an auxiliary communication shut off position.

2. The controller according to claim 1, wherein

a male threaded portion is formed at an upper end of the operating shaft, a female threaded portion for screw fitting to the male threaded portion is formed at an inner periphery of the spring receiver, the spring receiver being screw fit to the operating shaft, supported to the casing in a non-rotatable and up and down movable manner, the elastic force of the pressure spring is made adjustable by the spring receiver moving up and down when the operating shaft is rotated.

3. The controller according to claim 1 or 2, wherein the power transmitting means includes:

a first conical roller receiving member extending perpendicularly downward from a lower end of the operating shaft;

a second roller receiving means arranged at an upper end of the valve rod;

a pair of roller supporting bodies arranged symmetrically with respect to an axis of the first roller receiving member between both roller receiving members;

a pair of rolling rollers supported at an upper part of each roller supporting body in a freely rotating manner and contacted to a tapered surface of the first roller

receiving member; and

a pair of presser rollers supported at a lower part of each roller supporting body in a freely rotating manner and contacted to an upward roller receiving surface of the second roller receiving member, wherein

each roller supporting body is supported at the casing so as to move pivotally with an axis shifted towards the axis of the first roller receiving member with respect to the axis of the presser roller, and

the biasing means for biasing the operating shaft downward is a double winded compression coil spring and received between an upper surface of the first roller receiving member and the partition plate.